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MONOGRAPHIC STUDIES IN THE GENUS ELEOCHARIS—II[1]

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(Plates 219–221)

Series 6. Palustriformes

Sub-series: Palustres

Sub-series: Truncatae[2]

a. Achenes[3] 0.7–1.5 mm. long (including style-base); upper sheath truncate, indurated and usually mucronate at summit....*b*.

b. Achenes with prominent keel-like angles; spikelets long-cylindric.....62. *E. tricostata*.

b. Achenes without keel-like angles.....*c*.

c. Rootstocks very stout, 4–5 mm. in diameter; scales of the rootstock 2–3 cm. long; culms subterete (Northwestern United States).....68. *E. decumbens*.

c. Rootstocks thinner; rootstock-scales when present rarely exceeding 1 cm. in length; culms usually angled or flattened.....*d*.

d. Culms flattened, frequently exceeding 1 mm. in width; scales of the spikelet (except sometimes in var. *atrata*) with conspicuous whitened, often bifid, acuminate tips.....60. *E. compressa*.

d. Culms 4–8-angled; scales obtuse to acute, or in *E. acutisquamata* with acuminate but not whitened tips.....*e*.

[1] Brooklyn Botanic Garden Contributions, No. 65. The present paper is a continuation of the series in Rhodora xxxi., there ending on p. 242. The numbering of the species continues that in the earlier paper.

[2] This group (defined in Rhodora xxxi. 128 and Contrib. Gray Herb. No. 86 (1929)) is strictly American. For treatment of the North American representatives of the sub-series Palustres see M. L. Fernald and A. Brackett, Rhodora xxxi. 57–77, and Contrib. Gray Herb. No. 83 (1929).

E. densa, without apparent septae, and very close to the tropical *E. geniculata*, is omitted from the present key and will be later treated with *E. geniculata* and *E. nodulosa*.

[3] In study of the achene-markings a magnification of 30x–40x has been used.

e. Scales acuminate, usually somewhat spreading (Texas).....61. *E. acutisquamata.*
e. Scales obtuse to acute.....*f.*
f. Style-base much depressed or truncate, often with a central apiculate projection.....*g.*
g. Tip of upper sheath whitened; achenes 0.7–1 mm. long; culms capillary, not exceeding 8 cm. in height (Newfoundland to Western Quebec and Northern New England).....59. *E. nitida.*
g. Tip of upper sheath dark-girdled; achenes 0.9–1.5 mm. long; culms coarser (sometimes capillary in typical *E. capitata*).....*h.*
h. Rootstocks creeping and elongated.....58. *E. capitata.*
h. Rootstocks vertical and greatly thickened; the numerous wiry culm-bases persisting (Northern Pacific States).....67. *E. Bolanderi.*
f. Style-base conic, pyramidal or mucroniform.....*i.*
i. Style-base mucroniform, its sides nearly parallel; the nearly smooth achenes showing only faint reticulation under magnification (Mexico to South America).....65. *E. montana.*
i. Style-base conic or pyramidal.....*j.*
j. Spikelets linear-lanceolate, 1–1.5 cm. long. 64. *E. Parishii.*
j. Spikelets ovoid to ellipsoid.....*k.*
k. Surface of achene scarcely reticulate under magnification; style-base pyramidal (Texas).....66. *E. Palmeri.*
k. Surface of achene clearly pitted or reticulate under magnification.....*l.*
l. Surface of the olivaceous achene coarsely and deeply roughened-reticulate, the projecting angles of the cells conspicuous.....58. *E. capitata.*
l. Surface of the yellowish or brown achene with shallow but distinct pitting or reticulation.....63. *E. arenicola.*
a. Achenes 1.7–2 mm. long (including style-base); upper sheath oblique, not indurated.....69. *E. fallax.*

The following abbreviations for herbaria are employed in citation of specimens (where no letter is appended, the specimens are in the Gray Herbarium):

B. Brooklyn Botanic Garden; C. Canadian National Herbarium; D. C. C. Deam; G. Gray Herbarium; I. University of Illinois; N. United States National Herbarium; N. Y. New York Botanical Garden; P. Pomona College; Ph. Philadelphia Academy of Natural Sciences; S. Riksmuseet, Stockholm; T. University of Tennessee; W. University of Wisconsin.

With the exception of *E. palustris* no North American species of *Eleocharis* has suffered so much from nomenclatorial tangles as *E. capitata*, and it is safe to say that none offers so complex a series of morphological variations. Until comparatively recent times the name *E. tenuis* (Willd.) Schultes was accepted for the common plant

of eastern United States, but Blake[1] has shown that the name *E. capitata* must be based entirely upon the Clayton specimen cited by Linnaeus from Gronovius' "Flora Virginica," an interpretation which has been followed by nearly all botanists in America. Blake's view has, however, been disputed by Farwell (RHODORA xxxii. 180–181 (1930) and Am. Midland Nat. xii. 175–178 (1930), who would apply the name *E. capitata* to the plant now known as *E. obtusa* (Willd.) Schultes upon the basis of Linnaeus' description of the spikelet as "subglobosa" and the culm as "tereti." Kalm's specimen of *E. obtusa* now in the Linnaean herbarium seems not to have been there in 1753 (Blake, RHODORA xxxii. 182 (1930)), but Farwell believes that a literal interpretation of the description is all-important and that the species under discussion was based upon a specimen of *E. obtusa* then in Linnaeus' herbarium but unrecorded and subsequently lost. Britton[2] has also found it difficult to reconcile Linnaeus' description of the spikelet as "subglobosa" with the elliptic spikelets which are characteristic of *Scirpus tenuis* and concludes that there was probably "some ancient error or mixture." Robert Brown was by no means the first botanist to recognize difficulties in the determination of *Scirpus capitatus* L., for as early as 1789, Ehrhart[3] had recognized that the contemporary interpretation of *S. capitatus*, the plant now called *Eleocharis ovata* (Roth) R. & S., was incorrect. Roth, in his earlier work,[4] held to Schreber's treatment, but in 1793[5] clearly realized that *Scirpus capitatus* did not grow in Germany and characterized the true plant as having tetragonous culms, no bristles, three stamens and three styles, in other words, *S. tenuis*. The plant which had been passing in Europe as *Scirpus capitatus* was thereupon described by Roth as *Scirpus ovatus*. The counterpart of this interpretation is seen in America in the treatment of *Scirpus obtusus* as *S. capitatus* L., by

[1] RHODORA xx. 23 (1918).

[2] TORREYA xix. 246 (1919). See also the discussions by Fernald, RHODORA xxiii. 106 (1921), and by Mackenzie, RHODORA xxx. 237 (1928).

[3] Beiträge iv. 155 (1789), where *Scirpus capitatus* of Schreber, Krocker and Roth [i. e. *E. ovata*] is said to differ from *S. capitatus* L., the former having a compressed culm, two stamens, and a bifid style. This comparison I take to be with the Gronovian plant (*Clayton* 380), but there is the very remote possibility that Kalm's plant (*E. obtusa*) might have been the basis of comparison, since *E. obtusa* invariably has three stamens and sometimes a three-parted style.

[4] Tent. Fl. Germ. i[1]. 28 (1788), referring to Schreber's Spic. Fl. Lips. 60 (1771).

[5] Tent. Fl. Germ. ii[2]. 562 (1793). "Planta indicata et sub hoc nomine descripta non est Scirpus capitatus Linn., monenti Praes. *de tetrabar*, sed longe aliena et nova species. Deleatus itaque nomen specificum cum differentia specifica et eiusdam loco ponatur."

Barton,[1] Elliott, Bigelow and other early writers. Perhaps this general confusion explains Roth's comparatively late (1793) publication of *Scirpus ovatus*, a European plant well known in earlier times.[2]

Linnaeus' description of *Scirpus capitatus* (Sp. Pl. i. 48 (1753)) was very brief:

> 5. SCIRPUS culmo tereti nudos etiformi, spica subglobosa. Scirpus culmo setaceo nudo, spica subglobosa. *Gron. virg.* 12. *Habitat in* Virginia.

It is most probable that Clayton's specimen came from eastern Virginia,[3] and a photograph loaned to me by Dr. Blake reveals the slender form which is characteristic of the coastal region. Since this form must be considered as typical, the outline of the achene becomes important, but Clayton's plant, which has been kindly examined for me by Mr. J. E. Dandy of the British Museum, is unfortunately immature and without achenes. There is little doubt however that the achenes, if they had been developed, would be small, olivaceous, and with a pyramidal style-base. Dr. Robinson's no. 470, collected in Clayton's neighborhood, agrees well in habit with the Linnaean specimen, and I have figured it (FIGS. 56, 57) as representing typical *E. capitata*. The typical form is recognizable as the very slender plant of moist, often sandy places, common northward to New England on the coastal plain and to some extent in the Piedmont region, and also found together with many other plants typical of the coastal plain in the silicious region of southern Nova Scotia.[4]

The name *Scirpus filiformis* Lamarck (1791)[5] antedates *Scirpus tenuis* Willd. (1809). A photograph of the type of *Scirpus filiformis* has been kindly supplied to me by Professor H. Lecomte of the Muséum d'Histoire Naturelle, in Paris. In this photograph four detached culms with spikelets occupy the center of the sheet together

[1] Compend. Fl. Phil. 31 (1818). "*S. ovatus* Willd. . . . *S. capitatus* Schreb. and Swartz. . . . From a careful comparison of original specimens from Schreber, Willdenow, and Swartz, in my herbarium with our native plant, I have added the above synonyms."

[2] A number of pre-Linnaean references are given by Willdenow, Sp. Pl. i. 294 (1797).

[3] John Clayton (1686–1773) was clerk of Gloucester County, Virginia. For biographical sketch see Britten, Journ. Bot. 47. 297–301 (1909).

[4] Mrs. Erlanson, Mich. Acad. Sci. Papers iv. 130 (1925), considers the very depauperate form represented by Grimes' no. 3774 from the vicinity of Williamsburg, Virginia, as probably the type form, but the Clayton type as shown in Dr. Blake's photograph is considerably larger than the Grimes' specimen in the Gray Herbarium.

[5] Ill. i. 138 (1791). The complete Latin citation is as follows:

> 651. SCIRPUS *filiformis*. S. culmo filiformi subangulato nudo, spica terminali ovata, squamis obtusis. Ex America septentrionali.

with the label "*Scirpus filiformis* du New York. Neumas [? the name is illegible] 88." Three culms to one side of the sheet have a small illegible label apparently reading "du la Caroline freyer [?]." One of the latter is identical with the material from New York, which is unmistakably typical *Eleocharis capitata;* the other culms from Carolina, though appearing immature, probably represent *E. tricostata* and so conform to a later description by Vahl,[1] and also to the derived descriptions by Pursh and Poiret of *S. filiformis* "spica oblonga obtusa." "Hab. in Carolina inferiore Lamarck." Although there is some mixture of species, the predominating material, in addition to carrying the label, conforms to Lamarck's description "culmo filiformi subangulato" and "spica terminali ovata." On the basis of material represented in this photograph *Scirpus filiformis* Lam. should without hesitation be considered a synonym of *S. capitatus* L.

The exact identity of *Scirpus tenuis* Willd. is not clear, but a minute fragment of a spikelet of the type specimen in the Berlin Herbarium, which I have examined through the kindness of Dr. Mattfeld and Mr. Weatherby,[2] seems to be the typical form of *Scirpus capitatus*. The type is in a juvenile state, having been grown at Berlin from seed sent to Willdenow by Muhlenberg. *Scirpus ellipticus* Willd. no. 1172, derived from Muhlenberg, and included under *E. tenuis* by Boeckeler, is, according to Dr. Mattfeld's letter, in a still younger condition. The culm of *Eleocharis tenuis* has generally been considered as four-angled, and the cross-section is so illustrated in Gray's Manual, ed. 7, fig. 258, but some material, and this is especially so in capillary specimens from Pennsylvania and Virginia, shows five-angled culms when carefully sectioned. *Scirpus quadrangulatus* Muhlenberg (1813), generally considered as a synonym of *Scirpus tenuis*, would seem by its very name to have been outstanding in culm characteristics, and it is very likely the plant with prominently four-angled culms, not uncommon in Pennsylvania, which I treat as *E. capitata* var. *pseudoptera* Weatherby.

As in other species of *Eleocharis*, variation in achenes is striking, but in *E. capitata* there is also a remarkable diversity in the culms as

[1] Vahl, Enum. ii. 248 (1805); Pursh, Fl. N. Am. i. 54 (1814); Poiret, Encyc. Meth. Suppl. v. 93 (1817); also *Isolepis filiformis* R. & S. Syst. ii. 106 (1817) and *Eleocharis filiformis* Kunth, Enum. ii. 146 (1837).

[2] I wish here to express my appreciation of Mr. Weatherby's kind assistance throughout my work at the Gray Herbarium in translations and bibliographic references, and especially for a series of detailed notes on the morphology and geographical variation of *Eleocharis capitata*.

seen in cross-section. Not only has the study of individual achenes of each specimen been necessary, but also in a very large number of cases sections of the culm have been examined. For routine work culms were boiled and then cross-sectioned with fine scissors. For the more careful cutting and staining of cross-sections of specimens, some of which are shown in the accompanying plate (220), I am greatly indebted to Miss H. M. Rusk of the Brooklyn Botanic Garden, and for the photographing of these sections, in addition to the achenes shown on the same plate, I must thank Mr. Louis Buhle, also of the Brooklyn Botanic Garden. To all who have made loans of specimens for study I am very grateful.

Four distinct geographical trends, which I have treated as varieties, appear in this examination of achenes and culm-sections. The var. *typica* characteristic of the coastal plain, has capillary culms, small olivaceous achenes with deep pitting and pyramidal style-base; var. *verrucosa* of the Mississippi Valley is similar, but with a depressed style-base; var. *borealis* is the coarse plant in bogs northward; and var. *pseudoptera* is confined to a limited area in the Middle Atlantic States. The achenes range from 0.9 mm. to 1.2 mm. in length including the style-base, but their mass varies much more than these small limits would indicate, due to varietal differences in turgidity of achene and in relative length of style-base. The achenes of var. *borealis* are as a rule larger in bulk than those of the other varieties. On the Atlantic seaboard there is little difficulty in the delimitation of these geographical variants and the number of intergrading specimens is surprisingly few. On the other hand examination of a large number of specimens from the Great Lakes region and the Mississippi Valley has not fully solved the problem of the interrelationship of *E. capitata*, *E. compressa*, and *E. acutisquamata*. A critical determination of specimens of *Eleocharis* is often difficult or even impossible if the material has been collected in the flowering stage, or if, as so often happens, the achenes have failed to develop, due to the attack of fungi or to other causes. The following key will serve to distinguish these geographical varieties of *E. capitata:*

a. Achenes wax-yellow,[1] in age becoming golden-yellow to dull orange,[2] averaging 1–1.1 mm. long (including the style-base); reticulation of achene usually shallow, the wavy transverse bands formed by the projecting cells thus more

[1] According to Ridgeway's "Color Standards and Color Nomenclature." Washington, D. C. (1912).

[2] *Xanthine-orange* in Ridgeway.

regular than in the typical variety; style-base flattened-triangular, often poorly distinguished from the body of the achene, with a short central projection; culms relatively stout, usually 6–8-angled. Bogs, meadows and pond-shores, Newfoundland to British Columbia and southward to the mountains of Tennessee.....Var. *borealis*.

a. Achenes olivaceous[1] (before maturity sometimes yellowish in var. *pseudoptera*, or yellowish-white in var. *typica*); reticulation of achene usually deep.....*b*.

b. Culms about 0.5 mm. thick, greatly elongated (usually 30–90 cm. tall), with 4 wing-like angles; achenes 1–1.1 mm. long, including the flattened triangular style-base. New Jersey to Virginia.....Var. *pseudoptera*.

b. Culms capillary, rarely exceeding 30 cm. in height; achenes averaging 0.9–1 mm. long, including the style-base.....*c*.

c. Achenes with an acute pyramidal style-base often 1/5 as high as the body of the achenes; culm 4-angled or 5-angled. Atlantic Coastal Plain.....Var. *typica*.

c. Achenes with a flattened style-base; reticulation as in var. *typica* but usually with some of the cell-projections verrucose; culms 5-angled. Mississippi Valley.....Var. *verrucosa*.

58. E. CAPITATA (L.) R. Br. var. **typica** (FIGS. 56, 57 and PLATE 220, FIGS. 1, 13). Culms capillary, 0.5–4 dm. high, usually quadrangular with slightly concave sides or five-angled, erect from a thickened creeping ligneous rootstock; stolons thickened, elongate, covered with acute brown or reddish scales; sheaths truncate at the apex, with a short mucro: spikelets ellipsoid to ovoid, acute or blunt, 3–10 mm. long, 20–30-flowered; scales ovate, obtuse or acute, reddish-brown to black, with a scarious margin and green keel; the lowest scale sub-orbicular and larger: styles 3-fid; stamens 3: achene obovoid, 0.8–1 mm. long, trigonous, olivaceous, alveolate, sometimes with wavy transverse bands formed by the projecting angles of the vertically elongated cells: style-base brownish, pyramidal: bristles 2 or 3, rarely persisting, light brown, less than half as long as the achene.—Prod. i. 225 (1810) as to the name-bringing synonym; S. F. Blake, RHODORA xx. 23–24 (1918). *Scirpus capitatus* L., Sp. Pl. i. 48 (1753). *Scirpus tenuis* Willd., Enum. i. 76 (1809). (?) *Scirpus quadrangulatus* Muhl., Cat. 6 (1813) *nomen nudum*, not *S. quadrangulatus* Michx., Fl. i. 30 (1803). *Scirpus filiformis* Lam., Ill. i. 138 (1791); Pursh, Fl. N. Am. i. 54 (1814). *Eleocharis tenuis* Schultes, Mant. ii. 89 (1824); Torr., Ann. N. Y. Lyc. iii. 309 (1836) and Fl. N. Y. ii. 349 (1843); Kunth, Enum. ii. 145 (1837) probably excl. Brazilian plants;[2] Boeckl., Linnaea xxxvi. 448 (1869–1870); Britton, Journ. N. Y. Mic. Soc. v. 108 (1889); Britton & Brown, Ill. Fl. i. 255, fig. 595 (1896);[3] C. B. Clarke, Ill. Cyp. t. 39, figs. 6–9 (1909).[4] *Scirpus ellipticus* Willd.[5] ex Kunth, Enum. ii.

[1] *Yellowish-olive* in Ridgeway.

[2] Plants which I have seen so labeled are not *E. capitata*.

[3] This illustration represents the typical achene with conical style-base.

[4] These figures, accompanied in the legend by the notation "forma filiformis" undoubtedly represent the typical variety.

[5] In a letter sent to Mr. Weatherby, Dr. Mattfeld writes that the material represented by Willdenow 1172 is very young, and consists of a mixture of three spikelets of *Scirpus tenuis* and one of *S. obtusus*, as identified by Dr. Gray.

146 (1837); *?Eleocharis filiformis* Kunth and *E. elliptica* Kunth, Enum. ii. 146 (1837). *Eleogiton filiformis* A. Dietr., Sp. Pl. 96 (1840). *Trichophyllum tenue* Farwell, Rep. Mich. Acad. Sci. xxi. 359 (1920).—Nova Scotia to Virginia, chiefly on the coastal plain, but ascending some of the river valleys of eastern New England. NOVA SCOTIA: North Sydney, Cape Breton Island, *Macoun* 32228 (C); Halifax, *Macoun* 32224 (C); dryish gravelly banks, Meteghan, *Fernald & Long* 20154; peaty open pasture, Yarmouth, *Bissell, Pease, Long & Linder* 20152, 20153; flood plain of Salmon River, Truro, *Bean & White* 20159; New Germany, *Hamilton* 80823; Shubenacadie Grand Lake, *Fernald & Bissell* 20160. NEW HAMPSHIRE: shallow margin of river, Woodstock, *Fernald* 15508. MASSACHUSETTS: Amesbury, *A. A. Eaton;* Mystic Pond, *Wm. Boott* in 1873; Gay Head, *Seymour* 1605; West Tisbury, *Seymour* 1867, 1868. NEW YORK: moist depressions in oak woods, Bay Terrace, Staten Island, *Svenson* 3496 (culms 4–6 angled); swamp north of Manorville, Long Island, *Ferguson* 1502 (B); Montauk, *Ferguson* in 1923; swamp, Hempstead Reservoir, Long Island, *Ferguson* 392 (B). NEW JERSEY: Kaigns Point, *MacElwee* 293; Forked River, *MacElwee* in 1896. PENNSYLVANIA: Naomi River, Pocono Mt., *Porter* in 1893 (Ph); McCalls Ferry, *MacElwee* 724; roadside ditch, Greene County, *Dickey* 252 (pathological); Cresson, *Wm. Boott* in 1875; Whiteland, Chester County, *E. B. Bartram* 1025. DELAWARE: 1 mile west of Stanton, *Randolph* 106 (distributed as *E. Torreyana*); sandy shores of estuarine inlet, Claymont, *Svenson* 3156. MARYLAND: sandy soil, open scrub land 2 mi. west of Elkton, *Randolph* 132. DISTRICT OF COLOMBIA: wet places in woods, Marshall Hall, *Holm* in 1899 (W). WEST VIRGINIA: by creek, Pickens, Randolph County, *H. H. Smith* 1354 (W). VIRGINIA: Williamsburg, *Grimes* 3760; Millboro, *C. F. Wheeler* in 1907; in dry soil of old fields near Buckroe, *Robinson* 470; Fairfax, *E. C. Leonard* 321 (B).

Var. **borealis**, n. var. (FIGS. 58, 59 and TAB. 220, FIGS. 4, 15), culmis crassioribus 6–8-angulatis; achaeneis luteis, angula exteriore obtusa; stylo-basi depressa, obtusa vel truncata, in medio apiculata.—Newfoundland to British Columbia; southward to New Jersey, Tennessee, Indiana, and Illinois. Specimens examined: NEWFOUNDLAND:[1] borders of pools and rills in limestone barrens, St. John Bay, *Fernald et al* 27523; Bay Bulls, Avalon Peninsula, *Fernald, Long & Dunbar* 26327; Bay of Islands, *A. C. Waghorne;* gravelly river bank, Glenwood, *Fernald & Wiegand* 4706; St. Johns, *Robinson & Schrenk* 127; springy places in ledges and gravel, Grand Falls, *Fernald & Wiegand* 4707; peaty or muddy borders of ponds, Grand Falls, *Fernald & Wiegand* 4710. QUEBEC: Romaine, Saguenay County, *St. John* 90183 (G, C); arbor vitae swamps, Carleton, Bonaventure County, *Fernald, Collins & Pease* in 1904; north fork of Madeleine River, Gaspé County, *Fernald,*

[1] Only a few specimens from the large collection in the Gray Herbarium from Newfoundland are cited.

Dodge & Smith 25497; vicinity of Montmorency Falls, *Macoun* 9300; Anticosti, *Marie-Victorin* 20162 (G, W), 2715 (W); Grindstone Island, Magdalen Islands, *Fernald et al* 6962. NEW BRUNSWICK: Bathurst, *Blake* 5443; St. John River, Connors, *Pease* 2969; Restigouche River, *Macoun* 32225 (C). NOVA SCOTIA: North Mt., Belle Isle, *Fernald et al* 23379; cool swamp near Digby, *Howe & Lang* 205; Rockville, Yarmouth County, *Fernald & Long* 20158; brackish marsh, Sand Beach, Yarmouth, *Long & Linder* 20147 (TYPE in Gray Herb.); border of brackish marsh at head of Abram River, *Fernald, Bean & White* 20161. MAINE: bog, summit of Mt. Battie, Camden, *G. G. Kennedy* 21; Sangerville, *Fernald* 303 (G, W); Monhegan Island, *Churchill* in 1921 (W); Orr's Island, *A. H. Norton* in 1924 (W) with somewhat flattened culms and large blackish spikelets. NEW HAMPSHIRE: bog near Crawford House, *Greenman* 1136; Warren, *E. F. Williams* in 1908; Holderness, *F. C. Seymour* in 1915 (W). VERMONT: sandy shores of bay north of South Hero, *E. Brainerd* in 1899; Ripton, *E. F. Williams* in 1908; South Cliff, Willoughby Mt., *Faxon* in 1895. MASSACHUSETTS: Great Pond, South Weymouth, *Greenman* 749; white cedar swamp, Springfield, *Clark & Seymour* G581 (W); Chelsea, *W. Boott* in 1853; Polpis, Nantucket, *M. A. Day* 30; Granville, *Seymour* 171. RHODE ISLAND: Morris Swamp, Providence, *J. F. Collins* in 1892. CONNECTICUT: Oxford, *Harger*, Kneucker Cyp. Exsicc. 138. NEW YORK: South Hill, Ithaca, *C. C. Thomas* 1766; Lake Harris, 1650 ft. alt., Essex County, *House* 7351; Mud Pond, Oswego, *Fernald, Wiegand & Eames* 14183; in sphagnum, pine barren bog, Central Islip, *Ferguson* 3052 (B); near bottom of glacial kettle-hole, Montauk, *N. Taylor* in 1914 (B). NEW JERSEY: Ridgefield, *Dautun* 21; Torrey ex herb. Thurber (without locality). PENNSYLVANIA: Dillerville Swamp, Lancaster County, *Heller* in 1901 (as *E. glaucescens*). TENNESSEE: Fountain City dam, in water, *J. K. Underwood*, April 23, 1930 (B). ONTARIO: Marshfield, *C. F. Wheeler* in 1893; Frenchman's Bay, Lake Huron, *Macoun* 34570; Pelee Island, Lake Erie, *Macoun* 32227 (C). MICHIGAN: Port Huron, *C. K. Dodge* in 1893; Bois Blanc Island, Jackson County, *Camp* 3224 (W); sandy shore of Temperance Point, L. Michigan, *Ehlers* 2652 (W). INDIANA: East Chicago, *Lansing* 2578; Roby, *Lansing* 2541; Clarke, *Umbach* 3887 (W), 3647 (W), 4205 (W); along railroad, east of Bushrod, Greene County, *Deam* 10650 (D); marl border of Fish Lake, Lagrange County, *Deam* 39074 (D) (perhaps *E. compressa*); low marl border of lake east of Lagrange, *Deam* 36640 (D); low marl border of Still Lake, Howe, *Deam* 31298; in a slough 1 mi. south of Griffith, Lake County, *Deam* 31635 (D); Deep Lake, Noble County, *Deam* 14686 (D); ditch along railroad, Idaville, White County, *Deam* 38865 (D). WISCONSIN: Green Bay, *J. H. Schuette;* Bailey's Harbor, Door County, *J. J. Davis* in 1929 (W); Cornucopia, *J. J. Davis* in 1880 (W); Clark's Lake, *J. J. Davis* in 1929. MANITOBA: Red Deer Lake, lat. 53, *Macoun* 74. MINNESOTA: Fort Snelling Reservation, *C. O. Rosendahl* 2098. MON-

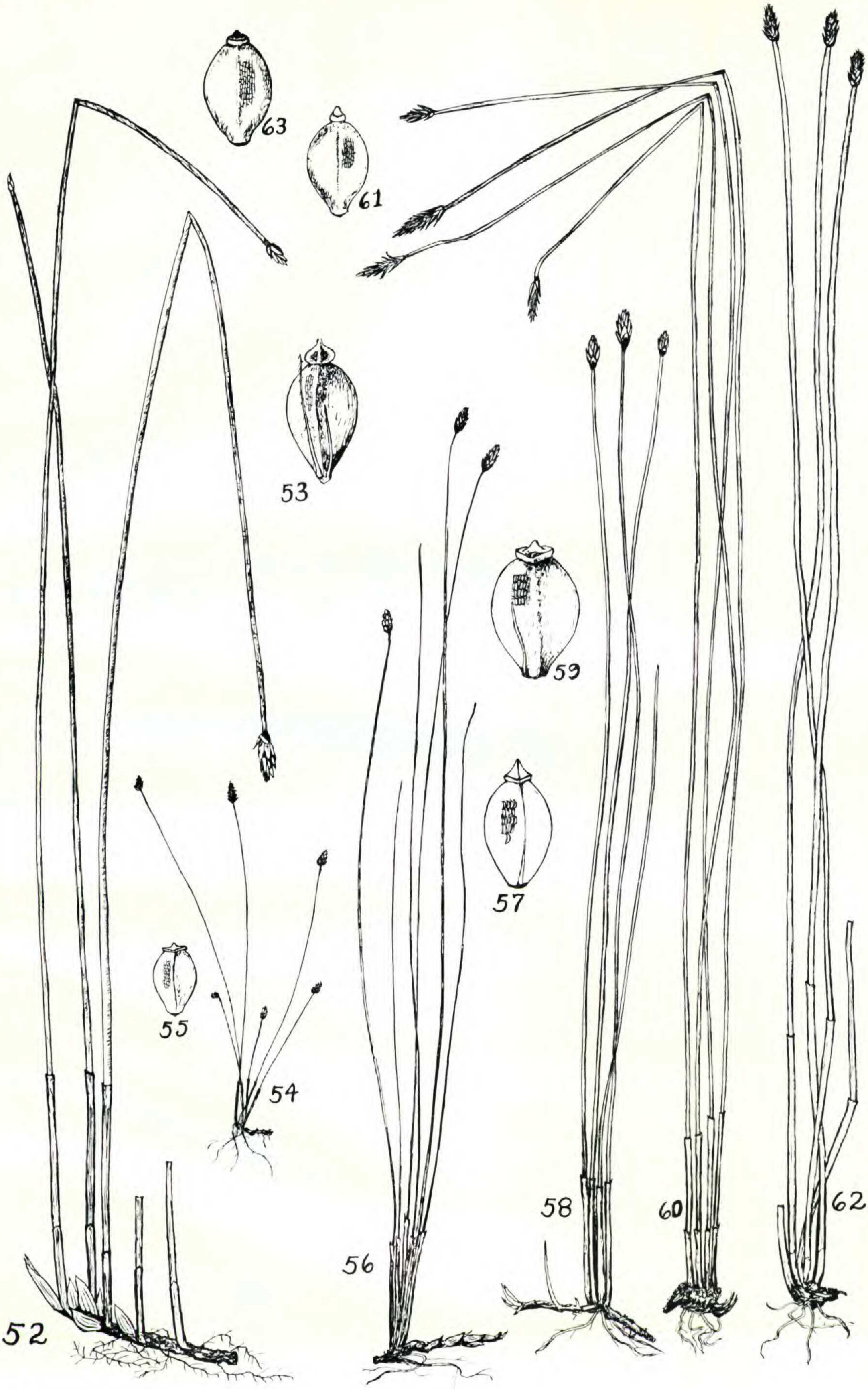
TANA: Columbia Falls, *R. S. Williams* in 1895. BRITISH COLUMBIA: swamp near Goldstream, *Macoun* 1067 (G, Ph); Eagle Pass, *Macoun* 7558.

Var. **pseudoptera** Weatherby,[1] n. var. (TAB. 220, FIGS. 3, 16), vaginis superioribus longe mucronatis, mucroni ad 1.5 mm. longo; culmis arcte quadrangulatis saepe leviter transverse septatis, angulis peracutis tenuibus siccatis sicut alae prominentibus, fasciculis vasorum plerumque 4, singulis ad angulas singulas, vel rarius 2 ad culmi latera inter angulas, costas tenues formantibus, distributis; achaeniis olivaceis vel luteis obovoideis pyriformibusve infra in basim sicut stipitem subabrupte angustatis, minute reticulato-rugosis, stylo-basi fusco vel griseo plerumque depresso mucrone angusto acuto cuspidata rarius convexo vel subpyramidale terminato.—Except when otherwise noted, all of the following specimens are at the Philadelphia Academy of Natural Sciences. NEW JERSEY: in fresh water, Bergen Point, Hudson County, June 18, 1893, *Thomas Seal*, TYPE in herb. Philadelphia Acad.; ditches and wet places, New Egypt, *Gross* 745; Skunk Swamp in a ditch, West Cape May, *O. H. Brown*, June 20, 1907; Closter, *Austin* in 1864 (B); New Durham, *Dautun* in 1903 (B); Hasbrouck Heights, *Dautun* in 1908 (B). PENNSYLVANIA: herb. *C. W. Short* (W); Bucks County, *Pretz*, June 17, 1899; wet springhead, Bethlehem, *Pretz* 5734; Ogontz, *B. Long* in 1908; Philadelphia, *Nuttall;* Springfield, *B. H. Smith*, June 20, 1891; serpentine region southeast of Wissiston, *Van Pelt* in 1905; cedar barrens, *Pennell*, June 27, 1912; forming a swale in serpentine barrens along Conewago Creek, *Svenson* 3454 (B). DELAWARE: without definite locality, *Baldwin* ex herb. Schweinitz; low ground along Penn. R. R., Claymont, *Svenson* 3457 (B); springy place in field, 1 mi. west of Stanton, *L. F. & F. R. Randolph* 107 (G). VIRGINIA: 4-mile run, *A. S. Hitchcock* in 1905 (I).

In this variety, which ranges from New Jersey and eastern Pennsylvania to Virginia, the culms, though becoming the stoutest in the entire species, remain 4-angled and with 4 vascular bundles, or if one or two others occur sometimes between the angles, they are much smaller, forming only a slender rib. The angles are very acute and project at the corners of the culm like narrow wings. The achenes of this variety are in most cases olive, subpyriform and with a truncate tubercle. The sheaths commonly have an unusually long and prominent mucro (up to 1.5 mm. long). This variety is easily recognized in the field; the elongated glistening culms form dense swales, sometimes nearly a meter high.

Var. **verrucosa**, n. var. (TAB. 220, FIGS. 2, 14), achaeniis olivaceis verrucosis, stylobasi depressa; culmis quinquangulatis.—INDIANA:

[1] The description is by Mr. Weatherby.



H. K. Svenson del.

ELEOCHARIS, SERIES PALUSTRIFORMES.

(Habit × ½; achenes × 15).

FIGS. 52, 53, E. DECUMBENS; 54, 55, E. NITIDA; 56, 57, E. CAPITATA, var. TYPICA; 58, 59, E. CAPITATA, var. BOREALIS; 60, 61, E. ACUTISQUAMATA; 62, 63, E. COMPRESSA.